

Claims

[c1] What is claimed is:

A method for determining a sonde error in a logging tool comprising a transverse array, comprising:

obtaining a first measurement using the transverse array while the logging tool is at a first height from ground in a selected orientation;

obtaining a second measurement using the transverse array while the logging tool is at a second height from the ground in the selected orientation;

deriving a difference measurement from the first measurement and the second measurement;

determining a background signal using the difference measurement and a predetermined function, wherein the predetermined function relates earth signals in a plurality of signals obtained at the second height to a plurality of difference signals between signals obtained at the first height and the second height at a plurality of formation conductivities; and

determining the sonde error by subtracting the background signal from the second measurement.

[c2] The method of claim 1, wherein the first height is lower

than the second height.

- [c3] The method of claim 1, wherein the predetermined function is obtained by fitting the plurality of difference signals to the plurality of signals obtained at the second height.
- [c4] The method of claim 1, wherein the predetermined function comprises a polynomial function.
- [c5] The method of claim 1, wherein the plurality of signals obtained at the second height and the plurality of difference signals are derived from simulation of a formation model.
- [c6] The method of claim 1, wherein the logging tool is arranged horizontally above the ground.
- [c7] The method of claim 1, wherein the logging tool is arranged vertically above the ground.
- [c8] A method for determining a sonde error in a logging tool comprising a triaxial array, comprising:
obtaining a first measurement for at least one coupling of the triaxial array while the logging tool is at a first height from ground in a selected orientation;
obtaining a second measurement for the at least one coupling of the triaxial array while the logging tool is at

a second height from the ground in the selected orientation;
deriving a difference measurement from the first measurement and the second measurement for the at least one coupling of the triaxial array;
determining a background signal using the difference measurement and a predetermined function for the at least one coupling of the triaxial array, wherein the predetermined function relates earth signals in a plurality of signals obtained at the second height to a plurality of difference signals between signals obtained at the first height and the second height at a plurality of formation conductivities; and
determining the sonde error by subtracting the background signal from the second measurement for the at least one coupling of the triaxial array.

[c9] The method of claim 8, wherein the first height is lower than the second height.

[c10] The method of claim 8, wherein the predetermined function is obtained by fitting the plurality of difference signals to the plurality of signals obtained at the second height.

[c11] The method of claim 8, wherein the predetermined function comprises a polynomial function.

[c12] The method of claim 8, wherein the plurality of signals obtained at the second height and the plurality of difference signals are derived from simulation of a formation model.

[c13] The method of claim 8, wherein the logging tool is arranged horizontally above the ground.

[c14] The method of claim 8, wherein the logging tool is arranged vertically above the ground.

[c15] A system for determining a sonde error in a logging tool having a transverse array, the system comprising a memory storing a program comprising instructions for: obtaining a first measurement using the transverse array while the logging tool is at a first height from ground in a selected orientation; obtaining a second measurement using the transverse array while the logging tool is at a second height from the ground in the selected orientation; deriving a difference measurement from the first measurement and the second measurement; determining a background signal using the difference measurement and a predetermined function, wherein the predetermined function relates earth signals in a plurality of signals obtained at the second height to a plurality

of difference signals between signals obtained at the first height and the second height at a plurality of formation conductivities; and
determining the sonde error by subtracting the background signal from the second measurement.

[c16] The system of claim 15, wherein the first height is lower than the second height.

[c17] The system of claim 15, wherein the predetermined function is obtained by fitting the plurality of difference signals to the plurality of signals obtained at the second height.

[c18] The system of claim 15, wherein the predetermined function comprises a polynomial function.

[c19] The system of claim 15, wherein the plurality of signals obtained at the second height and the plurality of difference signals are derived from simulation of a formation model.

[c20] A system for determining a sonde error in a logging tool having a triaxial array, the system comprising a memory storing a program comprising instructions for:
obtaining a first measurement for at least one coupling of the triaxial array while the logging tool is at a first height from ground in a selected orientation;

obtaining a second measurement for the at least one coupling of the triaxial array while the logging tool is at a second height from the ground in the selected orientation;

deriving a difference measurement from the first measurement and the second measurement for the at least one coupling of the triaxial array;

determining a background signal using the difference measurement and a predetermined function for the at least one coupling of the triaxial array, wherein the predetermined function relates earth signals in a plurality of signals obtained at the second height to a plurality of difference signals between signals obtained at the first height and the second height at a plurality of formation conductivities; and

determining the sonde error by subtracting the background signal from the second measurement for the at least one coupling of the triaxial array.

[c21] The system of claim 20, wherein the first height is lower than the second height.

[c22] The system of claim 20, wherein the predetermined function is obtained by fitting the plurality of difference signals to the plurality of signals obtained at the second height.

- [c23] The system of claim 20, wherein the predetermined function comprises a polynomial function.
- [c24] The system of claim 20, wherein the plurality of signals obtained at the second height and the plurality of difference signals are derived from simulation of a formation model.
- [c25] The system of claim 20, wherein the logging tool is arranged horizontally above the ground.
- [c26] The method of claim 20, wherein the logging tool is arranged vertically above the ground.